Sp44: Should blood culture results be awaited, before planning tissue biopsy and, is tissue biopsy essential for confirming the diagnosis in the presence of positive blood cultures?

Andreas K. Demetriades , Marco Teli, Hideyuki Arima , Karthik Ramachandran

Recommendation:

I. Obtain blood cultures promptly in all suspected cases of discitis, ideally before starting antibiotics.
II. Proceed to tissue biopsy if: Blood cultures remain negative after 5–7 days, Atypical pathogens are suspected, or there is inadequate response to empirical therapy.
III. Biopsy may be deferred if: Blood cultures are positive for a typical organism and there is strong clinical and radiological correlation.

This strategy optimizes diagnostic accuracy while enabling timely, targeted treatment, reducing the need for unnecessary invasive procedures. Clinical judgment should guide further refinements in special scenarios such as immunocompromised patients or paediatric cases.

Strength of Recommendation: Moderate

Delegate Vote:

Background :
Discitis (spondylodiscitis) is a serious infection requiring prompt diagnosis and targeted antimicrobial therapy. Blood cultures and image-guided tissue biopsy are key diagnostic tools, but their optimal use remains debated.

Methodology :
This consensus statement was developed using a systematic review of available literature, including IDSA/ESCMID clinical guidelines, meta-analyses, and high-quality observational studies. Evidence was evaluated for diagnostic yield, microbiological concordance, and clinical outcomes.

Part 1) Should blood culture results be awaited before planning tissue biopsy?

i. Blood cultures should be obtained promptly in all suspected cases of discitis and incubated for at least 5–7 days (including for fastidious organisms).
ii. If blood cultures are positive (yield ~30–60%), tissue biopsy may not always be necessary, especially if:
    a. The organism identified is a typical pathogen (e.g. Staphylococcus aureus, Streptococcus spp., or Gram-negative bacilli).
    b. Clinical and radiological findings are consistent with the microbiological diagnosis.
    c. There is a satisfactory clinical response to targeted therapy.
iii. If blood cultures are negative (or remain indeterminate), a percutaneous or surgical tissue biopsy is strongly recommended to guide antimicrobial therapy, particularly in regions with high tuberculosis prevalence or when atypical pathogens (e.g. Brucella, fungi, or Mycobacterium tuberculosis) are suspected.

Rationale:

i. Blood cultures have moderate sensitivity (~50%) but high specificity.
ii. Delaying biopsy while awaiting blood culture results (typically 48–72 hours) does not significantly compromise outcomes if the patient is clinically stable.
iii. Early biopsy is justified in cases of sepsis, neurological compromise, or suspicion of resistant/tuberculous infection.

Berbari et al (1): Recommends blood cultures as first-line, with biopsy if cultures are negative or atypical pathogens are suspected.
Gouliouris et al (2): Blood cultures have ~50% sensitivity; biopsy is critical if cultures are negative or in TB-endemic regions.
Zimmerli et al (3): Blood cultures should be obtained first, but biopsy is needed if no organism is identified.
Kehrer et al (4): Blood cultures alone miss ~40% of cases, necessitating biopsy in culture-negative scenarios.
Trecarichi et al (5): In TB discitis, biopsy is often required despite blood culture results.

Part 2) Is tissue biopsy essential for confirming the diagnosis in the presence of positive blood cultures?

i. Tissue biopsy is not routinely required if:
- Blood cultures yield a typical pathogen (e.g. S. aureus, E. coli).
- Imaging findings (MRI/CT) are consistent with infectious spondylodiscitis.
- There is no suspicion of a polymicrobial, fungal, or mycobacterial infection.

ii. Tissue biopsy should still be considered if:
- Clinical improvement is inadequate despite appropriate antibiotics.
- Blood cultures reveal atypical organisms (e.g. Candida, Brucella, M. tuberculosis).
- There is concern for secondary abscess, spinal instability, or need for surgical debridement.

Rationale:
i. Concordance between blood cultures and biopsy cultures is ~50–70%, but discordance can occur due to prior antibiotics or fastidious organisms.
ii. Biopsy provides histopathological confirmation, assesses antimicrobial resistance, and aids in diagnosing non-bacterial causes (e.g. TB, fungal infections).

Bernard et al (6): Blood culture-guided therapy is sufficient in uncomplicated cases, but biopsy may be needed if treatment fails.
Sobottke et al (7): Biopsy can be avoided if blood cultures are positive and clinical response is good.
Mylona et al (8): Blood cultures and biopsy have similar yields, but biopsy is needed for resistant/unusual pathogens.
Cotte et al (9): Biopsy is essential if blood cultures are negative or if atypical organisms (e.g., *Brucella*, fungi) are suspected.
Grammatico (10): Blood cultures alone may suffice for *S. aureus*, but biopsy is critical for culture-negative or polymicrobial infections.

References :

1. Berbari EF, Kanj SS, Kowalski TJ, et al. 2015 Infectious Diseases Society of America (IDSA) Clinical Practice Guidelines for the Diagnosis and Treatment of Native Vertebral Osteomyelitis in Adults. Clin Infect Dis. 2015;61(6):e26-e46.

2. Gouliouris T, Aliyu SH, Brown NM, et al Spondylodiscitis: Update on Diagnosis and Management. J Antimicrob Chemother. 2010;65(Suppl 3):iii11-iii24.

3. Zimmerli W. Clinical Practice: Vertebral Osteomyelitis. N Engl J Med. 2010;362(11):1022-1029.

4. Kehrer M, Pedersen C, Jensen TG, et al. Increasing Incidence of Pyogenic Spondylodiscitis: A 14-Year Population-Based Study. J Infect. 2014;68(4):313-320.

5. Trecarichi EM, Di Meco E, Mazzotta V, et al. Tuberculous Spondylodiscitis: Epidemiology, Clinical Features, Treatment, and Outcome. Eur Rev Med Pharmacol Sci. 2012;16(Suppl 2):58-72.

6. Bernard L, Dinh A, Ghout I, et al. Antibiotic Treatment for 6 Weeks Versus 12 Weeks in Patients with Pyogenic Vertebral Osteomyelitis: An Open-Label, Non-Inferiority, Randomised, Controlled Trial. Lancet. 2015;385(9971):875-882.

7. Sobottke R, Röllinghoff M, Zarghooni K, et al. Current Diagnosis and Treatment of Spondylodiscitis. Dtsch Arztebl Int. 2008;105(10):181-187.

8. Mylona E, Samarkos M, Kakalou E, et al. Pyogenic Vertebral Osteomyelitis: A Systematic Review of Clinical Characteristics. Semin Arthritis Rheum. 2009;39(1):10-17.

9. Cottle L, Riordan T. et al Infectious Spondylodiscitis. J Infect. 2008;56(6):401-412.

10. Grammatico L, Baron S, Rusch E, et al. Epidemiology of Vertebral Osteomyelitis (VO) in France: Analysis of Hospital-Discharge Data 2002–2003. Epidemiol Infect. 2008;136(5):653-660.